

DETAILED ACTION

Status of Claims

1. The status of the claims as filed in the reply dated 11/11/2011 are as follows:

Claims 1-11 and 13 are canceled;

Claims 12 and 14- 22 are pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 12, 14-15, and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dienhart et al (US6189334B1, previously of record) in view of Fuerschbach (US4815534, previously of record).

Re Claim 12. Dienhart et al discloses a heat exchanger device (11) includes a conduit extending into the inlet channel for the cooling agent to supply the cooling agent to the third porthole channel (15) and the second passages (17), and

wherein the conduit further comprises a U-shaped conduit portion (20; a portion of the conduit is U-shaped, i.e. half a circle would be U-shaped) extending into (21) and out (22) of the outlet channel (14) for the cooling agent such that heat exchange takes place between the cooling agent in the conduit portion and the cooling agent in the outlet channel (Figure 1 & 2), and

wherein the outlet channel for the cooling agent includes the fourth porthole channel (16) and a pipe (14) which extends outwardly from the fourth porthole channel and the plate package, wherein the conduit portion extends at least into and out of the pipe (Figure 2).

Dienhart et al. fails to specifically disclose that the heat transfer device is a plate heat exchanger.

Fuerschbach, however, teaches a heat transfer device comprising a plate heat exchanger (ref 10), wherein the plate heat exchanger includes a plate package of heat transfer plates, which are arranged to form between the plates first passages for a heat transfer medium to be cooled and second passages for a cooling agent, wherein (Figure 2; Column 5 lines 46-49; Column 5 line 66 to Column 6 line 8):

the plate package includes a first porthole channel (ref 40a) and a second porthole channel (ref 40), which communicate with the first passages, and a third porthole channel (ref 41) and a fourth porthole channel (ref 41a), which communicate with the second passages (Figure 2; Column 5 line 46 to Column 6 line 8);

the first porthole channel (ref 40a) forms at least a part of an inlet channel to supply the heat transfer medium to the plate heat exchanger;

the second porthole channel (ref 40) forms at least a part of an outlet channel to discharge the heat transfer medium from the plate heat exchanger;

the third porthole channel (ref 41) forms at least a part of an inlet channel to supply the cooling agent to the plate heat exchanger;

the fourth porthole channel (ref 41a) forms at least a part of an outlet channel to discharge the cooling agent from the plate heat exchanger;

the heat exchanger device includes a conduit (ref IC) extending into the inlet channel for the cooling agent to supply the cooling agent to the third porthole channel and the second passages (Figure 2; It is obvious that an inlet conduit would be connected to the cooling medium inlet since some form of a pipe is necessary to transfer the cooling agent)

In view of Fuerschbachs' teaching, it would have been obvious to one of ordinary skill in the art at the time of invention to substitute a tube and fin heat exchanger for a plate heat exchanger as they are art recognized equivalents for the purpose of heat exchange between two fluids. In both cases, there are two inlets and two outlets for the two fluids to enter and exit out of the heat exchanger so as to flow through the heat exchanger and exchange heat. In addition, the plate heat exchanger provides the advantage of being capable of being used as a liquid to liquid heat exchanger, which is known in the art to have improved heat exchange efficiency.

Re Claim 14. Dienhart et al. further teaches that the conduit portion extends into and out of the fourth porthole channel (16, Figure 2; Column 2 lines 52-58 teaches that the fourth channel 16 and the tube 14 can be formed integrally to one another, thus the conduit portion would extend into the fourth channel).

Re Claim 15. Dienhart et al. further teaches the conduit portion extends in a U-shaped path in the outlet channel (Figure 2, a portion of the conduit portion will flow in a U-shaped path).

Re Claim 18. Dienhart et al. further teaches the conduit portion (ref 20) extends in a path which is significantly longer than double the distance between an entrance position for the entrance of the conduit portion into the outlet channel and a position of the conduit portion located as far as possible from the entrance position (Figure 2; Column 2 line 59 to Column 3 line 6).

Re Claim 19. Dienhart et al. further teaches that the conduit portion extends in a helical-shaped path (ref 20) in the outlet channel (Figure 2; Column 2 line 59 to Column 3 line 6)

Re Claim 20. Dienhart et al. further teaches the conduit is included in a cooling agent circuit, which includes a compressor (10), a condenser (11), an expansion valve (12) and an evaporator (13) that includes the plate heat exchanger (Figure 1).

Re Claim 21. Dienhart et al. further teaches the conduit portion is located between the condenser and the expansion valve (Figure 1).

Re Claim 22. Dienhart et al. teaches a heat exchanger with two flow paths but fails to specifically teach that the two flow paths operate in a parallel or counterflow direction to one another. Fuerschbach, however, teaches that the inlet and outlet channels are arranged such that the heat transfer medium flows through the first passages in a counterflow direction or a parallel flow direction in relation to the cooling agent flow in the second passages (Figure 2; Column 5 line 46 to Column 6 line 8). In view of Fuerschbachs' teaching, it would have been obvious to

one of ordinary skill in the art at the time of invention to select a preferred flow path in order to optimize the heat exchange efficiency of the system as is well known in the art.

4. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dienhart et al. (US6189334B1, previously of record) in view of Fuerschbach (US4815534, previously of record) and in further view of Watanabe et al. (US6928833B2, previously of record).

Re Claim 16 & 17. Dienhart et al. as modified by Fuerschbach teaches the conduit extending into the heat exchanger but fails to teach that the conduit portion includes surface enlarging members including flanges, which are provided on the conduit portion and extend in the outlet channel. Watanabe et al., however, teaches that the conduit (ref 11) portion includes surface enlarging members including flanges (ref 13), which are provided on the conduit portion and extend in the outlet channel (Figure 1). In view of Watanabe et al.'s teachings, it would have been obvious to one of ordinary skill in the art at the time of invention to modify the conduit of Takao et al to include flanges, since this would increase the surface area of the conduit, and thus increase the heat transfer to the conduit, which is well known in the art to increase the efficiency of the refrigeration system.

Response to Arguments

5. Applicant's arguments filed 11/11/2011 have been fully considered but they are not persuasive.

The applicant argues that in Dienhart that the "fluid in the circuit cannot at the same time be both the heat transfer medium to be cooled and a cooling agent". The examiner traverses this statement as the applicant is misinterpreting the Dienhart reference. The Dienhart reference teaches the same fluid circuit as the applicants claimed invention (see Figure 1 of Dienhart and Figure 1 of applicants invention). Specifically, Dienhart teaches that a cooling agent is supplied from an evaporator and passes through an outlet channel of the condenser, then passes through the compressor, then enters the condenser and passes through the first conduit portion in the outlet channel of the condenser. Thus, the cooling agent (i.e. refrigerant) flows through the entire system with a portion being passed through the condenser twice. The collector 14 of Dienhart can exchange heat between the fluid in the coil 20 with the fluid that passes through the collector. Since the same fluid is at different temperatures, heat exchange can occur between the same fluid. Therefore, the fluid in the circuit is only the cooling agent and the heat transfer medium is the air that passes over the fins of the heat exchanger.

The applicant further states that "the fluid flowing through the tubes 17 of Dienhart corresponds to the heat transfer medium of recited in claim 12. Likewise, the air flowing in contact with the corrugated fins 18 in Dienhart corresponds to the cooling agent recited in claim 12". The examiner traverses this assertion as the applicant is misinterpreting the reference. The fluid flowing through the tubes and the collector is the cooling agent (i.e. refrigerant) that is supplied from a vapor compression system. The heat transfer medium is the air that passes through the corrugated fins 18 of Dienhart. Thus Dienhart does teach that two fluids exchange heat with one another, with one fluid exchanging heat with itself prior to entering the tubes of the heat exchanger.

Applicant argues that Dienhart “only discloses a collector 14, which is provided outside the tubes 17. No pipe extends outwardly from a porthole is disclosed”. The examiner traverses this assertion as Dienhart does disclose these features. As can clearly be seen in Figure 2 of Dienhart, a collector (which is the end port of the heat exchanger) has a tube inlet 21 at the top of the collector that allows for the cooling agent to enter into the collector. Thus, Dienhart clearly illustrates a pipe that extends from a porthole.

In response to applicant's argument that certain fluids flow through the heat exchanger, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

In response to applicant's argument that there is no teaching, suggestion, or motivation to combine the references, the examiner recognizes that obviousness may be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988), *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992), and *KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398, 82 USPQ2d 1385 (2007). In this case, the recitation of heating and cooling a fluid is intended use of the invention, as noted above. Further, the applicants argument that there is no motivation to modify or combine the references is based on misinterpreting and misconstruing the prior art references (as discussed above).

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TRAVIS RUBY whose telephone number is (571)270-5760. The examiner can normally be reached on Monday-Friday 9:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Judy Swann can be reached on 571-272-7075. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Travis Ruby/
Examiner, Art Unit 3785

/CHERYL J. TYLER/
Supervisory Patent Examiner, Art Unit
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